PROPOSED PLAN

Site 1 - Former Drum Marshalling Area Soil, Soil Vapor, and Shallow On-Facility Groundwater

Former Naval Weapons Industrial Reserve Plant
Bethpage, New York

Introduction

This **Proposed Plan** identifies the preferred remedial alternative for cleaning up the contaminated soil, soil vapor, and shallow on-facility groundwater at Site 1 - Former Drum Marshalling Area, former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, New York. This document provides the rationale for the preferred alternative and includes summaries of other cleanup alternatives evaluated for use at this site. The preferred alternative includes the following:

- Construction of a reduced permeability cover,
- Excavation and consolidation or offsite disposal of polychlorinated biphenyl (PCB)-contaminated soil,
- Continued operation and upgrades to an existing **Soil Vapor Extraction (SVE)** Containment System,
- Monitoring of soil vapor and groundwater, and
- Implementation of **Land Use Controls (LUCs)**.

The Navy's **Environmental Restoration Program (ERP)** conducts its environmental cleanup work for the former NWIRP under the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** and the Defense Environmental Restoration Program. The Navy is the lead agency for the **CERCLA** cleanup. The **New York State Department of Environmental Conservation (NYSDEC)**, with assistance from the **New York State Department of Health (NYSDOH)**, is the lead state agency providing regulatory consultation to the Navy.

The **Proposed Plan** is a document that the Navy is issuing in accordance with the requirements of **CERCLA** §117(a) and the **National Contingency Plan (NCP)** §300.430(f)(2).

***Bold words are defined in the Glossary.**

Mark Your Calendar for the Public Comment Period and Meeting

Public Comment Period

November 22, 2017 through January 22, 2018

Submit Written Comments

The Navy will accept written comments on the Proposed Plan during the public comment period. To submit comments or obtain further information:

Public Affairs Officer
Code 09PA
Naval Facilities Engineering Command,
Mid-Atlantic
9324 Virginia Ave, RM. 302
Norfolk, VA 23511

Location of the Information Repository

Bethpage Public Library
47 Powell Road
Bethpage, New York 11714
(516) 931-3907

The Navy will hold a public meeting on December 12, 2017 from 3:30 PM to 7:00 PM to discuss this Proposed Plan. The meeting will be held at:

Bethpage Senior Community Center
103 Grumman Road West
Bethpage, NY 11714

Copies of the Proposed Plan and the presentation will be available at the meeting. The administrative record for the facility is maintained online at:

http://go.usa.gov/DyXF

This **Proposed Plan** summarizes information that can be found in greater detail in the Remedial Investigation (RI)/**Feasibility Study (FS)** Report and other documents included in the Administrative Record file for the former NWIRP Bethpage. The Navy encourages the public to review these documents to gain a more comprehensive understanding of the Site and remedial activities that have been conducted.

The Navy, in consultation with the **NYSDEC**, pursuant to 10 United States Code (U.S.C) §2705(a) and (b) and 42 U.S.C. §9620(f), will select a final remedy for the site after reviewing and considering all information submitted during the 60-day public comment period. The Preferred Alternatives may be modified or another response action presented in this plan may be selected based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this **Proposed Plan**.

Site Background

Site 1 – Former Drum Marshalling Area is situated along the eastern boundary of the former NWIRP Bethpage (Figure 1). In addition, because of proximity, similarity of chemicals, and potential need for response actions, Site 1 also includes Area of Concern (AOC) 23 - former above ground storage tanks (ASTs); AOC 30 - former storage sheds; AOC 32 - two former tetrachloroethene underground storage tanks (USTs); and AOC 35 - former sanitary sludge drying beds or releases associated with these former AOCs. Similarly, former Dry Wells 20-08 and 34-07 are being addressed with Site 1.

Site 1: Starting in the 1950s, Northrop Grumman's hazardous waste management practices for facilities it operated on Long Island included marshalling of drummed wastes on the former NWIRP Bethpage property. The overall drum marshalling area initially consisted of three drum marshalling areas located in the center of the site that were used to store drums containing waste materials from operations at Plant 3 and potentially other sources at the former NWIRP Bethpage facility. Storage first took place on a cinder-covered surface over the cesspool field east of Plant 3. The waste drums reportedly contained chlorinated and non-chlorinated solvents, liquid cadmium and chromium wastes. During the early 1990's transformers that potentially contained PCBs and autoclaves were also stored on the ground at Site 1.

In 1978, the collection and marshalling point was moved a few yards south of the original unpaved site to an area on a 100- by 100-foot concrete pad. This pad

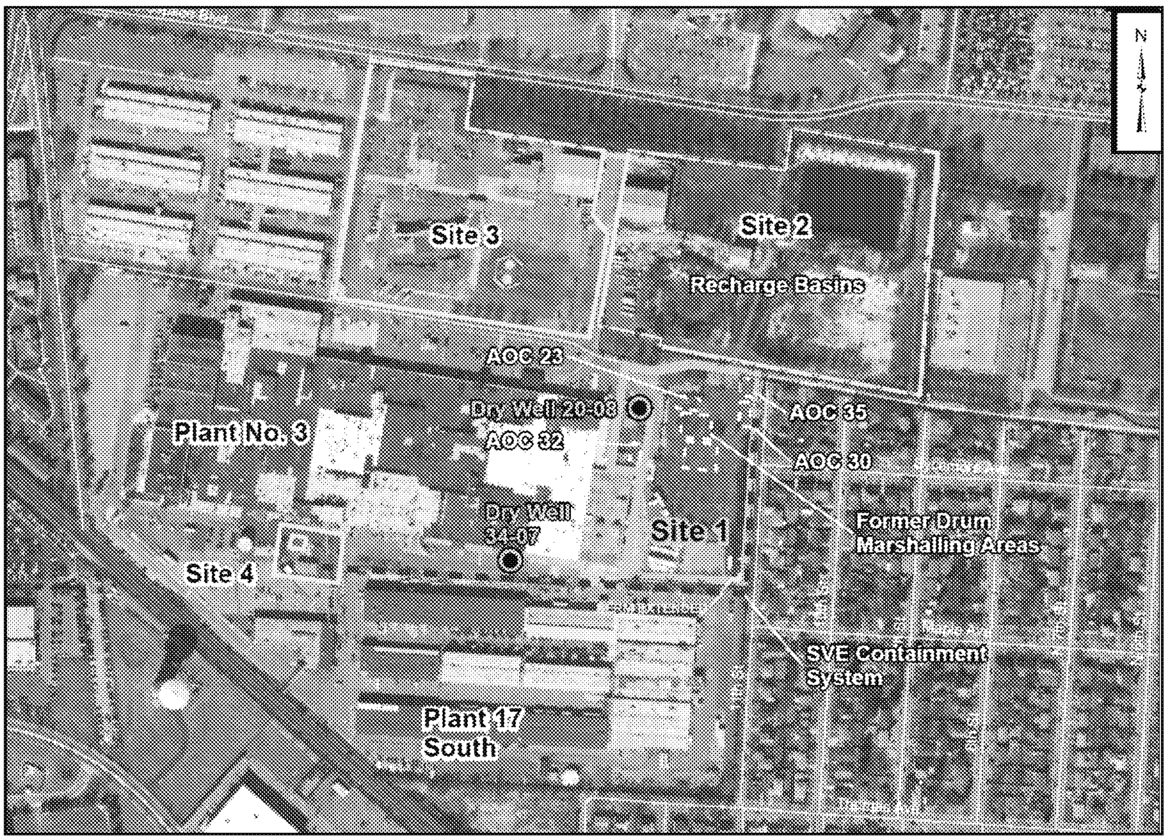


Figure 1 - Site 1 Location Map

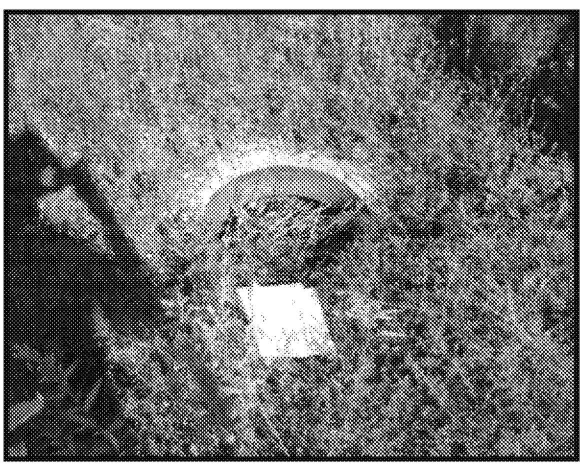
did not have a cover or spill containment. In 1982, drummed waste storage was transferred a third time to the Drum Marshalling Area, located in the Salvage Storage Area (Site 3). The Drum Marshalling Area consisted of a concrete pad with spill containment; and in 1983, a cover was added. Approximately 200 to 300 drums were stored at each area at any one time. Reportedly, all drums of waste marshalled at the Former Drum Marshalling Areas were taken off-property by a private contractor for treatment or disposal. There are no reports of leaks or spills of drum contents at Site 1.

Cesspools: Underlying most of Site 1 are approximately 120 abandoned cesspools that were designed to discharge sanitary waste waters from Plant 3. Each of these cesspools was approximately 10 feet in diameter and 16 feet deep. Based on field observations, the cesspools are currently filled with soil.

AOC 23: Six aboveground storage tanks (ASTs) were used at Plant 3 to store waste oil. All of these tanks have been removed from the site.

AOC 30: Three storage sheds were located east of Plant 3. One building was used for the storage of pesticides and one was used for the storage of petroleum products. The use of the third shed is unknown. These sheds have been removed from the site.

AOC 32: Two USTs, identified as Tanks 1090 and 1091, were used at Plant 3 for bulk storage of tetrachloroethene. In the 1980s, when an AST was constructed adjacent to this area to store tetrachloroethene, the two USTs were abandoned in place by Northrop Grumman. In the 1990s, Northrop Grumman removed the ASTs, and the USTs and the ASTs were identified the RCRA Permit as requiring "No Further Action". In 2012, the USTs and their contents were removed when they were encountered during construction activities. This Proposed Plan would address any releases from the AOC.



Site 1 Cesspool

AOC 35: AOC 35 included four sludge drying beds. The sludge drying beds were closed and backfilled in 1980.

Dry Wells 20-08 and 34-07: Dry Wells 20-08 and 34-07 were part of a storm water management system. The dry wells functioned to infiltrate low volumes of water and overflowed higher volumes of water into the recharge basins. PCB fluids are suspected to have entered the system through floor drains, and subsequently to underlying soil, through permeable well bottoms. In 1998, these Dry Wells were partially remediated under the **United States Environmental Protection Agency's (U.S. EPA's)** Underground Injection Control (UIC) program and the structures have been removed.

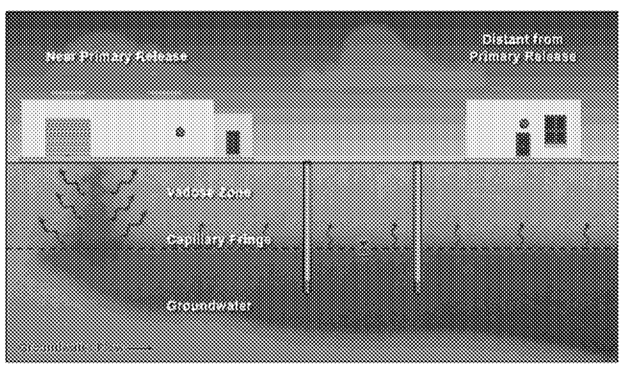
Remedial Investigation and Response Actions

The following investigations and response actions have been conducted at Site 1.

- In 1986, an Initial Assessment Study (IAS) of the former NWIRP Bethpage indicated that three areas, including Site 1, posed a potential threat to human health and the environment.
- From 1991 to 1993, a Remedial Investigation (RI) was conducted at the former NWIRP Bethpage. The RI identified the nature and extent (vertically and horizontally) of volatile organic compounds (VOCs), metals, and semi-volatile organic compounds (SVOCs) in contaminated soil and the nearby offsite groundwater contamination. The extent of PCB-contaminated soil was better defined.
- In 1993, a cover was placed over a portion of Site 1 (approximately 0.1 acre) to eliminate potential exposure of industrial workers by direct contact to PCB-impacted soil and potential exposure to off-property residents via dust migration of PCB-impacted soil.
- In 1994, an **FS** was conducted to develop, evaluate, and select potential remedial alternatives that could be implemented and that would protect human health and the environment from risks associated with environmental contamination at the former NWIRP Bethpage.
- In 1995, the Navy's Operable Unit (OU) 1 **Record of Decision (ROD)** identified PCB-, pesticide-, metal-, polynuclear aromatic hydrocarbon-, VOC-impacted soil and VOC-impacted shallow groundwater at Site 1; and PCB-, semi-volatile organic compound-, and/ or metal-impacted soil at Sites 2 and 3. The major components of the selected remedy for these sites included further delineation of arsenic- and PCB-

contaminated areas as part of a remedial design, soil excavation, and the construction, operation, and maintenance of an air sparge/soil vapor extraction (AS/SVE) system.

- In 1995, post-**ROD** remedial design studies began to delineate the extent of arsenic and PCB contamination. The results of the December 1995 pre-excavation sampling at Site 1 indicated that the volume and depth of contaminated soil was greater than originally estimated and that additional investigations would be required.
- Between 1996 and 2002, additional soil samples were collected to help delineate the extent of arsenic- and PCB-contaminated soil. Based on these test results, the volume of arsenic contamination was determined to be minimal and that a separate excavation and off-site disposal for this contaminant would not be required. The volume of PCB contamination was determined to be much more extensive, and in addition, a clean end point for PCBs was not obtained.
- Between 1997 and 2002, the AS/SVE system treated VOC-impacted soil and shallow groundwater and removed approximately 4,500 pounds of VOCs. In October 2002, the Navy reported that the objectives of the AS/SVE system had been met and proposed removal of the system. In December 2003, the **NYSDEC** concurred with this proposal and operation of the AS/SVE system was discontinued.
- In 1998, Dry Wells 20-08 and 34-07 were partially remediated under the UIC program. Soil removal actions were implemented to a depth of 30 to 32 feet below ground surface (bgs). Confirmation testing found that PCB-impacted soil remained at depth near and below the water table.
- In 2001, NYSDEC issued a **ROD** for OU2 that addressed contaminated groundwater from former Northrop Grumman and NWIRP Bethpage facilities. The ROD identified the following primary components: 1.) On-site Containment (ONCT) groundwater treatment system, 2.) GM38 area hotspot groundwater treatment system, 3.) Outpost groundwater monitoring system, and 4.) Public water supply contingency for well head treatment or comparable alternative measures of public water supplies.
- In 2003, Navy issued a **ROD** for OU2 that addressed contaminated groundwater from the former NWIRP Bethpage and identified activities that would be conducted by the Navy.
- In 2006, the existing soil data were evaluated and it was determined that to remove all PCBs greater than 1 milligram per kilogram (mg/kg), the soil excavation would need to extend to a depth of 65 feet bgs. Based on this estimated depth, it was concluded that the OU1 **ROD** for Site 1 could not be implemented as originally anticipated.
- In 2006, the NYSDOH finalized guidance to address vapor intrusion that may occur through direct volatilization of contaminants from groundwater into indoor air. Based on guidance at the time, the 1995 ROD did not identify this pathway as a potential concern. In January 2008, the Navy conducted an investigation along the eastern edge of Site 1 and nearby residential homes. The results of this investigation identified several VOCs including trichloroethene and tetrachloroethene that exceeded **NYSDOH** subslab screening values for evaluating potential vapor intrusion.
- In 2009, as an interim measure, air purification systems and sub-slab depressurization (SSD) systems were installed in effected residential homes. An **SVE** containment system was also constructed along the eastern boundary of the Navy property and began operation. Soil Vapor Pressure Monitors (SVPM) and soil vapor monitoring points were installed to monitor the vacuum field established by the system.
- Between 2010 and 2011, five sampling events of indoor air monitoring were conducted at the effected homes. During the first three sampling events, the concentration of VOCs decreased and by the fourth event (November 2010), indoor air concentrations were below the **NYSDOH** air guideline values. Based on this data, the air purification systems and the SSDs were removed.



Vapor Intrusion Pathways

Site 1 SVE Well and Containment System

No further action was necessary to mitigate vapor intrusion for the homes while the **SVE** containment system was in operation.

- In 2012, the USTs at AOC 32 were uncovered during regrading activities at Plant 3. The tanks contained soil and water that was contaminated with solvents and associated degradation products. The tanks were emptied out and the interior of the USTs were pressure washed to remove residual solid and liquid wastes and transported offsite to a recycling facility.
- In 2013, additional SVPMs and soil vapor monitoring points were installed in the residential neighborhood and results continue to be monitored to ensure that the **SVE** containment system continues to achieve the project goals.
- In 2015, an **RI** Addendum documented the need to address impacted media and pathways that were not included in the 1995 **ROD.** The selected media and pathways included deep PCB-contaminated soil, PCB- and metal-contaminated groundwater, and VOC-contaminated soil vapor at Site 1.
- In 2016, based on data and evaluations presented in the **RI** Addendum, an **FS** Addendum was developed to identify and evaluate remedial action alternatives to address the PCB impacts to the deep soil and groundwater at the site that were not known at the time of the 1995 **ROD**. In addition, the **FS** addresses residual VOCs in site soil and soil vapor, and metals in the groundwater.
- In 2017, a supplement to the 2016 **FS** addendum was prepared in response to a request from **NYSDEC** to consider additional alternatives that are consistent with remedial action (excavation of soil) established for the nearby Bethpage Community Park. The supplement to the **FS** Addendum included the addition of two new soil alternatives for consideration.

Site Characteristics

Site 1 is mostly an open and relatively flat lightly vegetated area with a 4-foot high windrow located along the eastern end of the Site. At the northern end of the Site, the grade is mounded in the area of an abandoned sanitary settling tank. The southern portion of the site is covered in asphalt and gravel and is used to store miscellaneous equipment and for vehicle parking. Except for the asphalt and gravel area, the site is enclosed by a former NWIRP Bethpage facility perimeter fence on the east and interior fencing on the north, west, and south.

Nature and Extent of Contamination

The discussion in this section is based primarily on soil, groundwater, soil vapor/indoor air, and lithologic investigations conducted from May 2009 to June 2013. In addition, information from sampling events prior to 2009 are used to support the development of the **conceptual site model (CSM)** and in particular the magnitude and extent of contamination. Soil data are compared to criteria ranging from unrestricted use to industrial use scenarios. Since groundwater is part of a sole source drinking water aquifer, associated data are compared to tap water risk screening levels, groundwater standards, and drinking water standards.

Surface soil throughout Site 1 contains PCBs and SVOCs at concentrations that exceed risk-based levels and **NYSDEC** Part 375 **Soil Cleanup Objectives (SCOs)** for Commercial Use. The maximum detection of PCBs in surface soil was 3,800 mg/kg (pre-1993 interim action after which a soil cover was applied to the area) and the maximum individual SVOCs concentrations are 1.1 to 4.6 mg/kg. In addition, several metals including arsenic at 55.8 J mg/kg, cadmium at 74.9 mg/kg, and chromium at 69.5 mg/kg exceed **NYSDEC** or **U.S. EPA** screening levels. Arsenic and cadmium exceed the **SCOs** at two locations each, which are collocated with PCB-contaminated soil. The area with residual metals and PCBs above screening levels is surrounded by fencing to prevent direct exposure to Site 1 contaminants. Those portions of Site 1 outside of the fenced area have gravel, concrete, or asphalt covers to prevent exposure. In addition, excavation activities at Site 1 are currently restricted through land use covenants in the lease.

The estimated areal extent of PCB-contaminated surface soil (0 to 2 feet bgs, with PCBs greater than 1 mg/kg) is approximately 4.5 acres and totals 14,500 cubic yards. The conceptual site model for PCB-contaminated

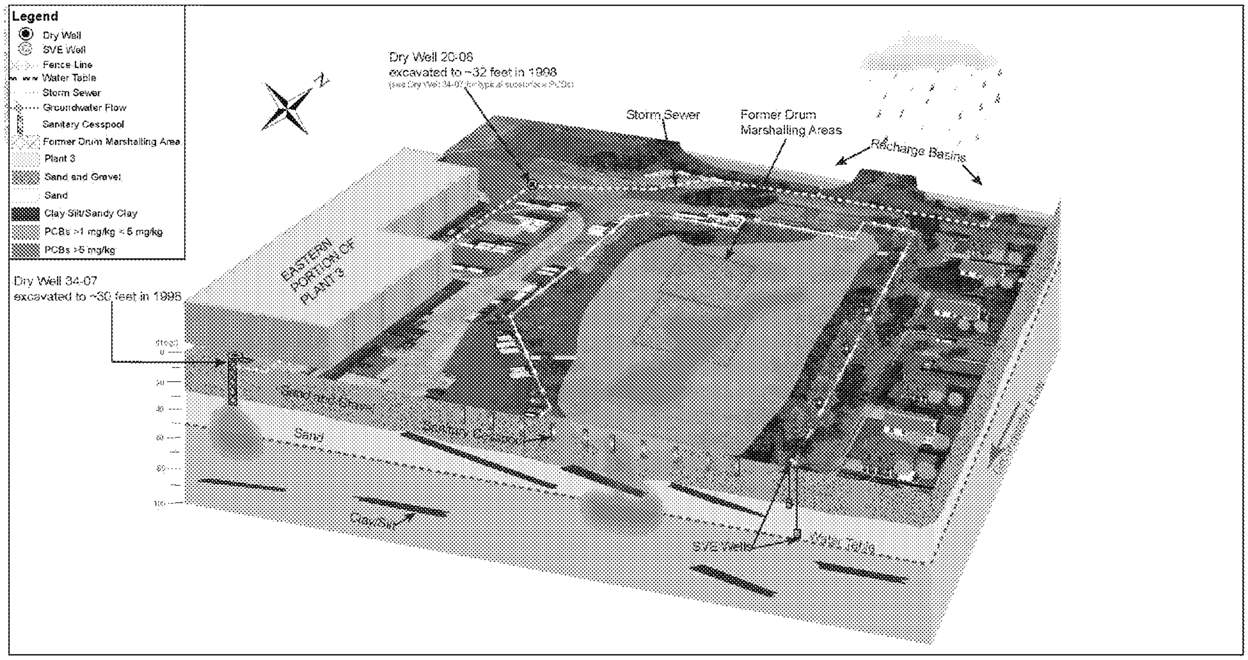


Figure 2 - Conceptual Site Model for PCB-Contaminated Soil

surface soil is presented on Figure 2. Based on the presence of gravel or concrete, there is no surface soil at Dry Wells 20-08 or 34-07.

Subsurface soil at this site contains PCBs, cadmium, and chromium at concentrations that exceed risk-based levels, **SCOs** for Commercial Use, or **SCOs** for Protection of Groundwater.

The maximum detection of PCBs in unsaturated subsurface soils (2 to 50 feet bgs) is 3,500 mg/kg at 8 to 10 feet bgs; the maximum detection of cadmium is 3,260 mg/kg at 10 to 12 feet bgs; and the maximum detection of chromium is 1,000 mg/kg at 10 to 13 feet bgs. These locations and depths generally correspond to the bottoms of the cesspools. Subsurface soil was sampled for total chromium. Since hexavalent chromium was used in plating operations at the site and was detected in site groundwater, some of the residual chromium in soil is likely in the hexavalent form and would exceed the **SCOs** for Commercial Use.

The PCBs are widespread throughout the area and in some locations are found throughout the soil column (maximum depth of 65 feet bgs), whereas the maximum cadmium and chromium detections and frequency of detection are generally associated with the former cesspools. Arsenic exceeds the **SCO**s at several locations at a maximum concentration of 150 mg/kg at 6 to 8 feet bgs. Also, SVOCs, VOCs, and metals were identified in the 1995 **ROD** and were retained as **Chemical of Concern (COCs)**. These **COCs** are collocated with PCB-contaminated soil.

Saturated subsurface soils at this site contain detections of PCBs, and to a lesser extent, cadmium and chromium. The detections of PCBs exceed the **SCOs** for the Protection of Groundwater, with the maximum detection of PCBs in saturated subsurface soils (50 to 65 feet bgs) of 310 mg/kg at 60 to 62 feet bgs. The maximum detection of cadmium is 8.2 mg/kg at 58 to 60 feet bgs and the maximum detection of chromium is 21 mg/kg at 50 to 52 feet bgs, both of which only slightly exceed **NYSDEC SCOs**.

The estimated areal extent of PCB-contaminated soil (2 to 65 feet bgs) and the volume of contaminated soil vary based on the PCB concentration. Using the 1 mg/kg PCB concentration, the areal extent is approximately 3 acres and affects approximately 130,000 cubic yard of soil (excluding the dry wells).

The areal extent of soil contamination at Dry Well 20-08 is approximately 0.38 acres and affects approximately 12,800 cubic yards. The areal extent of soil contamination at Dry Well 34-07 is approximately 0.02 acre, and affects 1,200 cubic yards. The conceptual site model for PCB-contaminated subsurface soil is presented on Figure 2.

Groundwater

Groundwater flows to the south southeast at Site 1 and the elevation ranges from approximately 73 to 70 feet mean sea level (MSL).

Shallow (40 to 67 feet bgs), intermediate-depth (95 to 200 feet bgs), and deep groundwater (180 to 294 feet bgs) at this site contain detections of VOCs, PCBs, hexavalent chromium, total chromium, and arsenic. The residual VOCs in groundwater are being addressed under this Proposed Plan and ROD or under the 2003

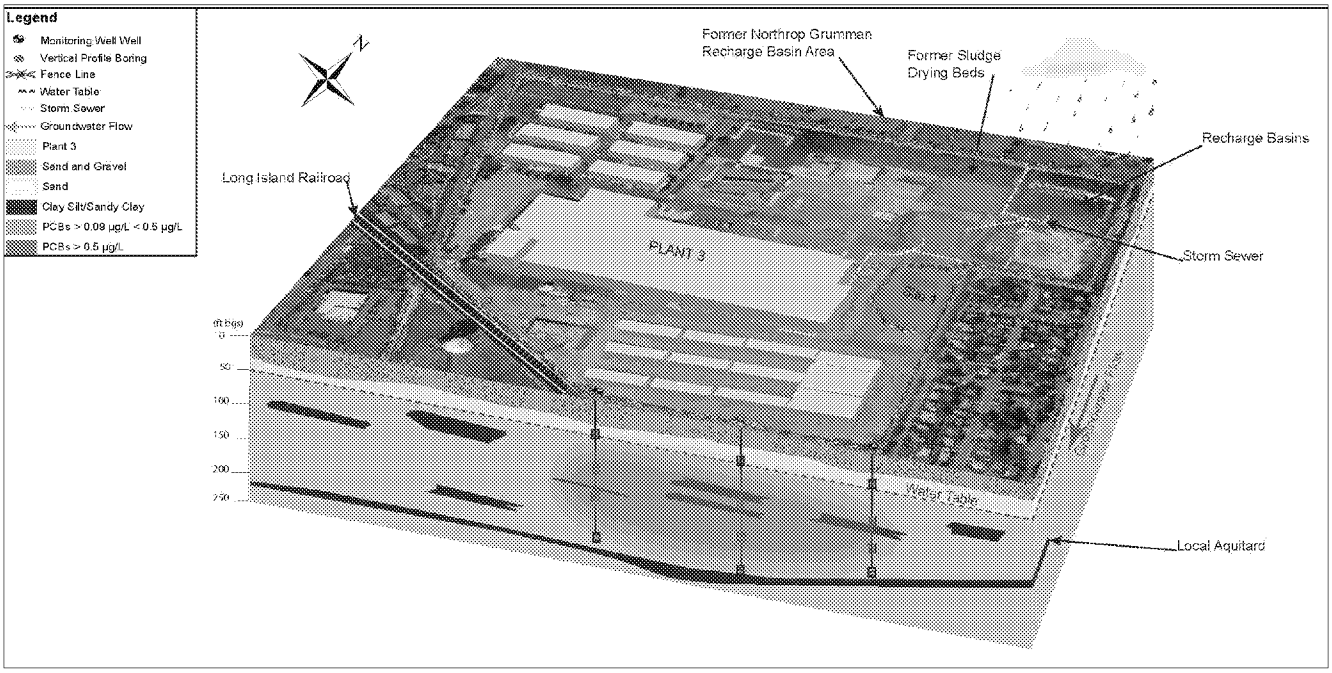


Figure 3 - Conceptual Site Model for PCB-Contaminated Groundwater

OU2 **ROD**. Detections of PCBs, hexavalent chromium, and total chromium exceeded Federal and **NYSDOH Maximum Contaminant Levels (MCLs)** and NYSDEC Groundwater Quality Standards. The conceptual site model for PCB-impacted groundwater is presented on Figure 3.

The maximum detection of PCBs in shallow groundwater is 24 micrograms per liter (µg/L), the maximum detection of total PCBs in intermediate-depth groundwater is 6.9 µg/L, and the maximum detection of PCBs in deep groundwater is 8.2 µg/L. The PCB NYSDOH **MCL** is 0.5 µg/L and the NYSDEC Groundwater Quality Standard is 0.09 µg/L. **MCL** exceedences of PCBs extend from Site 1 to the south and southwest to the property line of the former NWIRP Bethpage. NYSDEC PCB groundwater Quality Standard exceedences extend from the northern property line to the southern property line, suggesting that at least a portion of the PCBs originated from an upgradient source.

The maximum detections of hexavalent chromium in shallow groundwater is 158 µg/L, the maximum detection of hexavalent chromium in intermediate-depth groundwater is 200 µg/L, and the maximum detection of hexavalent chromium in deep groundwater is 86 µg/L. Detections of hexavalent chromium in shallow and intermediate-depth groundwater exceeded Federal and **NYSDOH MCLs**. The chromium/ hexavalent chromium Federal **MCL** is 100 µg/L and the **NYSDEC** Groundwater Quality Standard is 50 µg/L. The chromium exceedances are present sporadically throughout the former NWIRP property, with no apparent single source.

The maximum detection of arsenic in groundwater is 5.2 µg/L. The arsenic concentrations do not exceed Federal or **NYSDOH MCL** of 10 µg/L.

The estimated volume of PCB-contaminated groundwater above **MCLs** is approximately 550 million gallons, and extends south and southwest of Site 1 for at least 800 feet. Based on the concentration and volume, the groundwater contains approximately 4 pounds of soluble PCBs. The volume of groundwater contaminated with hexavalent chromium and the corresponding mass of hexavalent chromium in groundwater at concentrations above the **MCL** are estimated to be 6.4 million gallons and 7 soluble pounds, respectively.

Soil Vapor/Indoor Air

Carbon tetrachloride, chloroform, 1,1-dichloroethane, 1,2 -dichloroethane, tetrachloroethene, 1,2,4-trichloro-benzene, and trichloroethene were identified in site soil gas that if not managed could impact indoor air. Industrial/commercial buildings are present west and south of Site 1 and a residential neighborhood is located east of Site 1. An SVE containment system, operating as an interim measure, is used to control VOC soil vapor migration into residential homes. The source of the VOCs is believed to be soils located at variable depths throughout Site 1. An SSD system operates to control vapor intrusion into the former Plant 03 industrial building.

Fate and Transport of Contamination

CSMs convey what is known or suspected about contamination sources, release mechanisms, and the transport and fate of those contaminants. They provide a basis for understanding contaminant fate and transportation issues and assessing potential remedial technologies for the site. The overall **CSM** for Site 1 is presented on Figure 4.

The primary **COCs** at Site 1 consist of PCBs and VOCs. Other site contaminants, including metals, SVOCs, and pesticides are present, but are generally co-located with the significantly more extensive presence of PCBs in soil.

PCBs are generally considered to be relatively immobile in soil and groundwater. However, PCBs can contact water via precipitation infiltration and horizontal groundwater flow. In groundwater at Site 1, PCBs may have migrated with groundwater in either a dissolved or colloidal form.

One finding during the 2009 to 2012 testing was that vertical migration of PCBs extended to 15 feet below the current water table. Migration below the water table is not typical for chemicals such as PCBs, but could be explained by either the carrier fluid (e.g., chlorinated solvent) being denser than water or the water table being deeper at the time of the releases. Due to the absence of sufficient residual chlorinated solvent contamination present in the area of the PCB-contaminated soil, it is suspected that the water table may have been lower in the past.

Erosion of the surface soil into the adjacent storm sewer is possible. The storm sewer discharges into recharge basins located north of Site 1. PCBs have been detected in storm water entering the recharge basins. The use of deep recharge basins (i.e., over 40 feet deep) is a common method for disposal of water in this area. The depth of a basin is generally limited by the water table. The water table is currently at a depth of approximately 50 feet bgs at the former NWIRP Bethpage.

Bethpage Recharge Basin

Although direct contact with soil greater than 15 feet is not common, the potential for deeper excavations and reuse of the soils from the former NWIRP Bethpage is considered a viable migration pathway. Deep excavations could result from the construction of additional recharge basins, or because space is limited, a parking garage. Based on **LUCs** and **NYSDEC** concurrence, under either of these scenarios, deep contaminated soil could be excavated and re-used off property. **LUCs** are typically used as part of a remedy to ensure proper management of residual impacted soil.

In addition, PCB-impacted soil could migrate via dust formation and migration. Based on past risk assessment estimates and testing conducting in adjacent properties, this pathway is currently insignificant.

The VOCs at the site are generally considered to be relatively mobile in soil, soil vapor, and groundwater. The VOCs are believed to have been released from waste materials that Northrop Grumman stored at the site (e.g., drum marshalling areas) and/or through the sanitary cesspools. Once in the soil, the VOCs can migrate downward and impact groundwater or volatilize and impact soil vapors.

The majority of the Site 1 VOCs in soil and shallow groundwater were addressed via an AS/SVE system. In addition, VOCs in deeper groundwater and VOC migration away from Site 1 are being addressed via the ONCT system at the downgradient edge of the Northrop Grumman facility, approximately 5,000 feet south of Site 1, as identified in Navy's 2003 OU2 **ROD**.

Principal Threats

Based on site history, the shallow high concentration PCB -contaminated soil is considered to be "principal threat waste" because it is found at concentrations that pose a significant risk if an exposure scenario exists. If excavated, this material would be treated off-site as needed to comply with Land Disposal Restrictions.

Scope and Roles of the Action

Several response actions have been conducted at Site 1 to provide interim measures to protect human health and environment while a strategy for the final remedy is developed. This proposed remedy will be the final action for Site 1 and will address contaminated soil, groundwater, and soil vapor. Upon successful remediation, the Site will be transferred to Nassau County for economic redevelopment. Additional detail on past actions and how those action fit into the overall strategy are discussed below.

In 1993, a soil cover was placed over a small portion of Site 1 to reduce worker exposure to PCBs in surface soil.

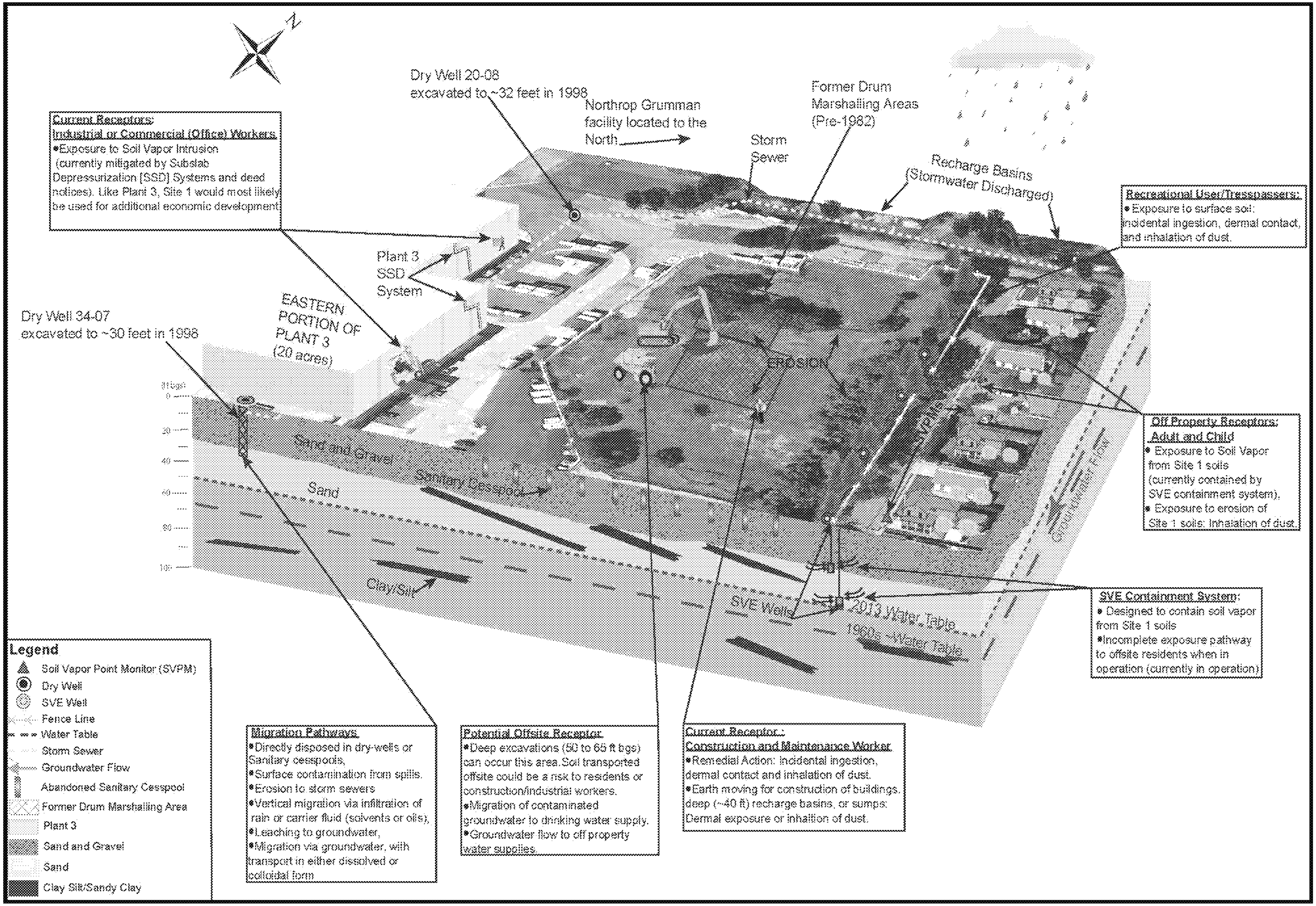


Figure 4 - Site 1 Conceptual Site Model (CSM)

What is a "Principal Threat"?

The NCP establishes an expectation that the lead agency will use treatment to address the principal threats posed by a site whenever practical (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a **Superfund** site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, free floating product at the groundwater table may be viewed as a source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding as to whether or not the remedy should employ treatment as a principal element.

Workers are currently protected from exposure to contaminated soil by the construction and maintenance of a fence. In 1995, the OU1 **ROD** was signed. This **ROD** addressed Sites 1, 2, and 3. For Site 1, the **ROD** identified treatment of VOC-impacted soil and shallow groundwater to eliminate a continuing source of groundwater contamination, excavation and/or covering of PCB- (and other COC-) impacted soil.

In accordance with the OU1 **ROD**, from 1997 to 2002, an AS/SVE system was operated to remove the majority of VOCs in impacted soil and shallow groundwater. This system achieved its goals and was shutdown.

Based on post-**ROD** soil delineation, there was a significant increase in the estimated volume of PCB-impacted soil for excavation, and as a result, that portion of the OU1 **ROD** was not implemented. This additional PCB-impacted soil is being addressed under this proposed remedial action.

In 1997, additional PCB-contaminated soil was identified in two nearby drywells. In 1998, soils to a depth of 30 to 32 feet were removed at Dry Wells 20-08 and 34-07 under the UIC program. Post excavation sampling identified residual PCB-impacted soil around and beneath the excavations. These residual contaminated soils are being addressed under this proposed action.

In 2009, the Navy implemented a CERCLA time-critical removal action that consisted of the installation and operation of air purification units and SSD units to reduce exposure to VOC-impacted vapors in off-property residences. In 2010, the Navy proceeded with a CERCLA non-time critical removal action in the form of an **SVE** containment system implemented to control VOC -impacted vapors at the property line, and which ultimately allowed the removal of the air purification units and SSD units. The **SVE** containment system remains in operation. Residual source material for these VOCs and continued operation of the **SVE** containment system are being addressed under this proposed action.

Each of the above activities has reduced or eliminated exposure to site contaminants. This proposed action will also address PCB- and metal-contaminated groundwater that was identified after the 1995 OU1 **ROD**. The shallow PCB-contaminated soil with concentrations greater than 50 mg/kg constitute principal threat wastes at the site. These shallow soils represent the majority of the PCBs present at the site and for which removal is practicable.

Summary of Site Risks

Human Health Risk Assessment

A quantitative risk assessment was conducted for Site 1 using both risk-based soil and groundwater screening values in the 2015 RI Addendum. Current potential receptors to contaminants in soil at Site 1 are construction workers, maintenance workers, and trespassers. Although not anticipated, a hypothetical scenario of a future onsite resident was also considered for Site 1 soil. In addition, the risk assessment evaluated current offsite industrial and commercial workers and residents that may be exposed to contaminants in soil vapor and groundwater migrating from the site. Future site use is anticipated to remain industrial or commercial after completion of remedial actions.

Initially, maximum detections of chemicals in the soil were compared to **U.S. EPA Regional Screening Levels (RSL)**, **U.S. EPA Soil Screening Level (SSL)**, **NYSDEC** Unrestricted Use **SCOs**, and **NYSDEC SCOs** for the Protection of Groundwater. Based on this screening, a more detailed risk assessment was conducted for soils. The results of this risk assessment did not indicate excessive risk to construction or maintenance workers or trespassers. The risk assessment estimated that there would be an **incremental lifetime cancer risk (ILCR)** for a potential future onsite resident of $2X10^{-4}$ and the **hazard index (HI)** was 8 under a reasonable maximum exposure duration of 26 years. An **ILCR** greater than $1X10^{-4}$ to $1X10^{-6}$ or a **HI** greater than 1 is considered to be unacceptable under CERCLA. PCBs and select VOCs and metals were the primary contributor to the **ILCR** and **HI**.

What is Human Health Risk and How is it Calculated?

A human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a site, the Navy performs the following four-step process:

Step 1: Analyze Contamination

Step 2: Estimate Exposure

Step 3: Assess Potential Health Dangers

Step 4: Characterize Site Risk

In **Step 1**, the Navy looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help the Navy to determine which contaminants are most likely to pose the greatest threat to human health.

In **Step 2**, the Navy considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency (how often) and length of exposure. Using this information, the Navy calculates a "reasonable maximum exposure (RME) scenario that portrays the highest level of human exposure that could reasonably be expected to occur.

In **Step 3**, the Navy uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. The Navy considers two types of risk: (1) cancer risk, and (2) noncancer risk. The likelihood of any kind of cancer resulting from a contaminated site is generally expressed as an upper bound probability. Under CERCLA, the target risk range for establishing cleanup goals is 1 in 10,000 to 1 in 1,000,000 excess cancer risks. In other words, for every 10,000 or 1,000,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than normally would be expected to from all other causes. For noncancer health effects, the Navy calculates a "hazard index." The **hazard index** represents the ratio between the "reference dose", the dosage at which no adverse health effects are expected to occur, and the "reasonable maximum exposure." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which noncancer health effects are no longer predicted.

In **Step 4**, the Navy determines whether site risks are great enough to cause health problems for people at or near the site. The results of the three previous steps are combined, evaluated in light of risk management factors, and summarized. The Navy adds up the potential risks from the individual contaminants and exposure pathways and calculates cumulative cancer and noncancer site risks.

Excavation of subsurface soil at Site 1 is currently restricted to prevent exposure.

For groundwater, the maximum detections of chemicals were used to establish **COCs** and develop site-specific risk calculations. The **COCs** were Aroclor-1242, -1248, and -1254, hexavalent chromium, arsenic, and VOCs (carbon tetrachloride, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, tetrachloroethane, 1,2,4-trichlorobenzene, and trichloroethene). Under the reasonable maximum exposure duration of 26 years, the calculated **ILCR** for a potential future resident was $1X10^{-3}$, but the **HI** was less than 1. In addition, VOCs in groundwater were compared to **U.S. EPA MCLs** and **NYSDOH MCLs**. These criteria are considered to be **Applicable or Relevant and Appropriate Requirements (ARARs).** PCBs, VOCs, and metals with concentrations exceeding **MCLs** are also considered **COCs** and pose a potential unacceptable risk for residential exposure to groundwater through potential ingestion, dermal contact, and inhalation via showering. Subsurface activities at Site 1 are currently restricted to prevent residential use of groundwater.

VOCs retained in the RI Addendum were considered as potential **COCs** for vapor intrusion. An **SVE** containment system, operating under a time-critical removal action, is used to control soil vapor intrusion (VOC) off-property and potentially into residential homes located to the east of Site 1. Use of this system as a final remedy was considered in the **FS**.

In the event that the SVE containment system is no longer operating, the Human Health Risk Assessment identified potential vapor intrusion issues with carbon tetrachloride, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, tetrachloroethene, 1,2,4-trichlorobenzene, and trichloroethene under the reasonable maximum exposure duration of 26 years. Based on modeling, the calculated **ILCR** ranged from $1X10^{-4}$ to $3X10^{-4}$. Calculated **HIs** ranged from 20 to 67. Industrial buildings are present west and south of Site 1. A residential neighborhood is located east of Site 1 and soil vapor could migrate to this area.

It is the current judgement of the Navy, in consultation with **NYSDEC**, that the preferred alternative identified in this **Proposed Plan** is necessary to protect the public health, welfare, and environment from actual or threatened releases of hazardous substances or pollutants or contaminants to the environment from Site 1.

Ecological Risk Assessment

Over 90 percent of the former NWIRP Bethpage property is covered by buildings, impermeable parking areas, roadways, and other development. No natural aquatic habitat exists on the former NWIRP Bethpage property. Since the areas surrounding Site 1 have been developed for commercial industrial use, there are no noted risks to ecological receptors and no detailed ecological risk assessment was prepared.

Remedial Action Objectives

The **Remedial Action Objectives (RAOs)** are statements that define the extent to which sites require cleanup to protect human health and the environment and the timeframe for attainment, as well as cleanup levels for the remedial action. Cleanup levels are among the **ARARs**, which the lead agency selects for the remedial action. The Remedial Action Objectives for soil, groundwater, and vapor intrusion are as follows:

- Prevent human exposures (ingestion, dermal contact, and dust inhalation) to contaminated soil at concentrations greater than **Preliminary Remediation Goals (PRGs)**.
- Prevent leaching **COCs** from soil to groundwater that would impact groundwater in excess of **PRGs**.
- Prevent human exposures (inhalation and ingestion) to contaminated groundwater at concentrations greater than **PRGs**.
- Prevent human exposure to contaminated soil vapors at concentrations greater than **PRGs**.
- Prevent offsite migration of contaminated soil via erosion to surface water and sediment in recharge basins.

Table 1 - Soil Preliminary Remediation Goals (PRGs)

Chemicals	PRG for Depths of 0 to 50 feet milligrams per kilograms (mg/kg)	PRG for Depth of 50 to 70 feet (mg/kg)
Metals		
Arsenic	16	16
Cadmium	9.3	7.5
Chromium, hexavalent	400	19
Pesticides		
Chlordane	24	2.9
Semi-Volatile Organic Compounds		
Benzo(a)anthracene	5.6	1.0
Benzo(a)pyrene	1.0	22
Benzo(b)fluoranthene	5.6	1.7
Benzo(k))fluoranthene	56	1.7
Chrysene	56	1.0
Dibenz(a,h)anthracene	0.56	1,000
Indeno(1,2,3-cd) pyrene	5.6	8.2
Volatile Organic Compounds		
1,1,1-Trichloroethane	500	0.68
Trichloroethene	200	0.47
Tetrachloroethene	150	1.3
Total PCBs	1.0	3.2

PRGs for soil are presented in Table 1. The **COCs** for soil represent a potential direct contact risk to human health (soils up to 50 feet deep) and/ or can leach and adversely impact groundwater quality (soil 50 to 70 feet deep). Open space is limited for additional growth of industrial and commercial activities in the area. As a result, construction activities (subsurface structures) in the area may extend below depths typically considered in a risk assessment (e.g., 2 or 10 feet bgs). **PRGs** for soil were developed in part based on **U.S. EPA RSLs** and **SSLs**, and **NYSDEC SCOs** for Commercial Use and for the Protection of Groundwater.

Target Indoor Air Performance Objective and **PRGs** for vapor intrusion are presented in Table 2. The Objectives for indoor air are based on **U.S. EPA** noncarcinogenic values (**HI** = 1). The fence line system remediation goal is based on the **U.S. EPA** Vapor Intrusion Guidance of a soil gas to indoor air attenuation estimate of 33 to 1. Values are presented for both indoor air and soil vapors in

Table 2 - Vapor Intrusion Preliminary Performance Objectives and Remediation Goals (PRGs)

Chemical	Target Indoor Air Performance Objective micrograms per cubic meter (µg/m^3)	Fence Line Soil Gas Remediation Goal (µg/m^3)
Volatile Organic Compounds		
Tetrachloroethene	42	1,400
Trichloroethene	2.1	69

close proximity to residential housing. An **SVE** Containment System is currently in operation as a removal action to control vapor migration to the east toward the residential neighborhood and a separate vapor extraction system is operating to control vapors under Plant 3.

PRGs for groundwater are presented in Table 3. **PRGs** for groundwater were developed based on **U.S. EPA MCLs**, **U.S. EPA** National Recommended Water Quality Criteria, **NYSDOH MCLs**, and **NYSDEC** Groundwater Quality Standards.

Summary of Remedial Alternatives

Remedial alternatives that address the potential risks associated with contaminated soil and groundwater at Site 1 and achieve **RAOs** were developed. In order to develop these alternatives, possible remedial activities were screened based on the nine **CERCLA** criteria, which includes effectiveness, implementability and cost (see Page 21). Based upon the results of the detailed screening of potential remediation technologies, fourteen remedial alternatives were developed and are described below. An evaluation of the site-wide alternatives is provided in Table 4 (soil), Table 5 (soil vapor) and Table 6 (groundwater).

Alternative S-1, SV-1, and G-1: No Action

Regulations implementing **CERCLA** generally require that "No Action" alternative be evaluated to establish a baseline for comparison. The no action alternative does not include institutional controls or remedial activities to identify or minimize risk to public health or the environment. Additionally, the no action alternative does not include a monitoring program or five-year reviews. Under this alternative, the existing **SVE** Containment System would no longer operate.

Soil Alternatives

Alternative S-2: Permeable Cover, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 10 mg/kg), and LUCs

This alternative includes excavation and offsite disposal of soil with greater than 10 mg/kg of PCBs to an estimated depth of approximately 9 feet below bgs, installation of a soil/gravel/asphalt permeable cover (depending on the end use of the area) over the residual PCBs and other **COCs** greater than the **PRGs**, and **LUCs** to protect the cover and limit future activities. The permeable covers at Dry Wells 20-08 and 34-07 would consist of structural materials to allow the use of heavy equipment. Surface soil with less than 10 mg/kg of PCBs and other **COCs** at less than the **PRGs** may be reused within the deeper excavation area. The remaining soil would be removed from the site and disposed of in an offsite landfill. This soil would be treated as required to comply with Land Disposal Restrictions. This alternative is similar in scope to the remedy that was anticipated in the OU1 **ROD** for Site 1.

LUCs would be implemented for soil and groundwater. Administrative restrictions would be included through deed notifications to restrict the installation or use of public water supply wells, construction activities, or other actions to limit groundwater or soil use. Deed restrictions may remain in place while contamination remains. Fencing is used to further restrict access to the site, and in particular, contaminated surface soil.

Alternative S-3: Resource Conservation and Recovery Act (RCRA) Cap, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 25 mg/kg), and LUCs

This alternative includes limited excavation and offsite disposal of soil with greater than 25 mg/kg of PCBs, installation of a **RCRA** Cap over the residual PCBs and other **COCs** greater than the **PRGs**, and **LUCs** to protect the cap and limit future activities. A **RCRA** Cap generally consists of a clay/synthetic composite layer, a drainage layer, and a soil/top soil layer. Surface soil with less than 25 mg/kg of PCBs and other **COCs** at less than **PRGs** may be reused within the deeper excavation area. This alternative reduces direct contact risk to contaminated soil and effectively eliminates continued leaching of unsaturated soil contamination to groundwater via precipitation infiltration. A concrete-based cap may be used in place of the **RCRA** cap in areas where heavy vehicle traffic occurs (e.g., dry wells 20-08 and 34-07).

Alternative S-4: RCRA Cap, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 25 mg/kg), Vertical Barrier, and LUCs

This Alternative is similar to Alternative S-3 in that it includes partial excavation of PCB-contaminated soils, installation of a **RCRA** cap over the residual PCBs and other **COCs** greater than the **PRGs**, and **LUCs**. Alternative S-4 also includes the installation of a vertical barrier to approximately 80 feet bgs (15 feet below the bottom of the soil contamination) to control horizontal migration of PCBs from saturated soil. Horizontal migration of soil vapor would also be controlled.

Alternative S-5A: RCRA Cap, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 25 mg/kg), In-situ Solidification of PCB-Contaminated Soil (Greater than 50 mg/kg), and LUCs

This alternative is similar to Alternative S-3 in that it includes partial excavation of PCB-contaminated soils, installation of a **RCRA** cap over the residual PCBs and other **COCs** greater than the **PRGs**, and **LUCs**. Alternative S-5A also includes the in-situ solidification of PCB-contaminated soil, containing greater than 50 mg/kg of PCBs. This treatment would encapsulate the higher concentration PCB-contaminated soil within a cement/ bentonite or similar matrix.

Table 4-- Ranking of Soil Alternatives

Criterion	**Alternative S-2:** Permeable Cover, Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 10mg/kg), and LUCs	**Alternative S-3:** RCRA Cap, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 25 mg/kg), and LUCs	**Alternative S-4:** Same as Alternative S-3 plus a Vertical Barrier	**Alternative S-5A:** Same as Alternative S-3 Plus In-situ Solidification of PCB-Contaminated Soil (Greater than 50 mg/kg)	**Alternative S-5B:** Same as Alternative S-4 Plus In-situ Solvent Extraction of PCB -Contaminated Soil (Greater than 50 mg/kg), and LUCs	**Alternative S-6:** Excavation and Disposal of PCB-Contaminated Soil (Greater than a Depth- Dependent 10 mg/kg or 50 mg/kg), Soil Cover, and LUCs	**Alternative S-6A:** Reduced Permeability Cover, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than a Depth-Dependent 10 mg/kg [Max 10 feet] or 50 mg/kg [Max 20 or 30 feet]), and LUCs	**Alternative S-6B:** Same as S-6A Plus In-situ Solidifications of PCB Contaminated Soil (Greater than 50 mg/kg)	**Alternative S-7:** Excavation and Offsite Disposal of PCB-contaminated Soil (Greater than 1 mg/kg)
Overall Protection of Human Health & the Environment	○	●	◊	◊	◊	◊	◊	◊	◊
Compliance with ARARs	●	●	◊	◊	◊	◊	◊	◊	◊
Long-Term Effectiveness & Performance	●	●	◊	◊	◊	◊	◊	◊	◊
Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	○	●	●	○	○	●	○
Short-term Effectiveness	●	●	●	●	●	●	●	●	●
Implementability	◊	◊	●	●	●	○	●	●	○
Time to Reach RAO (years)	5 years	6 years	7 years	8 years	11 years	7 years	7 years	8 years	10 years
Cost: Capital	$12,900,000	$14,600,000	$24,000,000	$23,600,000	$41,900,000	$55,400,000	$25,600,000	$30,500,000	$99,700,000
Cost: O&M	$12,800 to $43,000 per year	$12,800 to $43,000 per year	$12,800 to $43,000 per year	$12,800 to $43,000 per year	$12,800 to $90,300 per year	$12,800 to $43,000 per year	$12,800 to $43,000 per year	$12,800 to $43,000 per year	$0
Net Present Value	$13,400,000	$15,000,000	$24,500,000	$24,000,000	$42,800,000	$55,400,000	$26,000,000	$31,000,000	$99,700,000

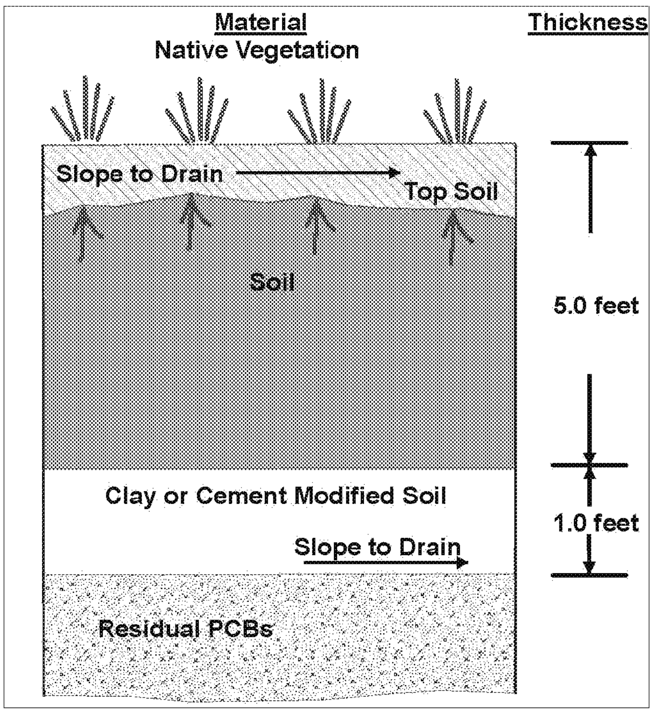
NA= Not Achieved ○ = Low Ranking ● = Moderate Ranking ◊ = High Ranking

Alternative S-5B: RCRA Cap, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 25 mg/kg), Vertical Barrier, In-situ Solvent Extraction of PCB-Contaminated Soil (Greater than 50 mg/kg), and LUCs

This alternative is similar to Alternative S-4 in that it includes partial excavation of PCB-contaminated soils, installation of vertical barriers and a **RCRA cap** cover over the residual PCBs and other COCs greater than the **PRGs** and **LUCs**. Alternative S-5B also includes the in-situ solvent extraction of PCB-contaminated soil, containing greater than 50 mg/kg PCBs. This treatment would remove PCBs from contaminated soil. Following treatment, a supplemental technology, such as biosparging, would be used to treat the residual solvent.

Alternative S-6: Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than a Depth-Dependent 10 mg/kg or 50 mg/kg), Soil Cover, and LUCs

Alternative S-6 includes excavation and offsite disposal of PCB-contaminated soils with concentrations greater than 10 mg/kg to a depth of 10 feet bgs and 50 mg/kg at depths over 10 feet bgs, and other **COCs** greater than the **PRGs**, installation of a cover over the residual PCBs, consolidation of contaminated soils with a depth dependent PCB concentration of 10 or 50 mg/kg under the cover, and **LUCs**. The shallow excavation and off-site disposal, soil cover, and **LUCs** for Alternative S-6 are similar to Alternative S-2. However, this alternative would also involve the excavation and offsite disposal of deeper soil, including saturated soil. Also, soil with other **COCs** at concentrations greater than the **PRGs** would be addressed with this excavation.



Reduced Permeability Cover

Alternative S-6A: Reduced Permeability Cover, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than a Depth-Dependent 10 mg/kg [Maximum of 10 feet bgs] to 50 mg/kg [Maximum of 20 or 30 feet bgs]), and LUCs

Alternative S-6A includes excavation and onsite consolidation or offsite disposal of PCB-impacted soil with concentrations greater than 1 mg/kg to a depth of 2 feet bgs and 10 mg/kg to a depth of 10 feet bgs; and excavation and offsite disposal of PCB-impacted soil with concentrations greater than 50 mg/kg to a depth of 20 feet bgs at Site 1 and to a depth of 30 feet bgs at Dry Well 20-08. Other soil with site-specific **COCs** greater than the **PRGs** would be handled with the PCBs. Alternative S-6A also includes installation of a reduced permeability cover over the residual PCBs and **LUCs**. This alternative is considered to minimize direct contact with impacted soil and reduce leaching of **COCs** to groundwater.

Alternative S-6B: Reduced Permeability Cover, Limited Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than a Depth-Dependent 10 mg/kg [Maximum of 10 feet bgs] to 50 mg/kg [Maximum of 20 or 30 feet bgs]), In-situ Solidification, and LUCs

This alternative is similar to Alternative S-6A in that it includes limited excavation of PCB-impacted soils, installation of a reduced permeability cover over residual PCB- and other **COC**-impacted soil, and **LUCs**. Alternative S-6B also includes the in-situ solidification of PCB-impacted soil containing greater than 50 mg/kg of PCBs. This treatment would encapsulate the higher concentration deep (approximately 20 to 65 feet bgs) residual PCB-impacted soil within a cement, bentonite, or similar matrix.

Alternative S-7: Excavation and Offsite Disposal of PCB-Contaminated Soil (Greater than 1 mg/kg)

Alternative S-7 includes excavation and offsite disposal of soil with PCBs greater than 1 mg/kg and other **COCs** greater than **PRGs**. The excavation would then be backfilled with clean soil. This alternative is similar to Alternative S-6 and includes potential reuse of clean soils that were excavated to support slope stability. Because all of the contaminated soil is removed from the site, it would not require the use of a soil cover or **LUCs**.

Table 5 - Ranking of Soil Vapor Alternatives

Criterion	Alternative SV-2: Soil Vapor Monitoring, LUCs, and Continued Operation of the SVE Containment System	Alternative SV-3: Same as Alternative SV-2 Plus Enhanced Soil Vapor Extraction at Site 1
Overall Protection of Human Health and the Environment	●	◊
Compliance with ARARs	●	●
Long-Term Effectiveness and Performance	●	●
Reduction of Toxicity, Mobility, or Volume through Treatment	●	◊
Short-term Effectiveness	●	◊
Implementability	◊	◊
Time to Reach RAO (years)	30 years	15 years
Cost		
Capital	$0	$220,000
O&M	$100,000 to $115,000 per year	$110,000 to $125,000 per year
Net Present Value	$2,600,000	$1,700,000

NA = Not Achieved ○ = Low Ranking

● = Moderate Ranking ◊ = High Ranking

Soil Vapor Alternatives

Alternative SV-2: Soil Vapor Monitoring, LUCs, and Continued Operation of the SVE Containment System

Alternative SV-2 is the continuing operation, maintenance, and monitoring of the existing **SVE** Containment System, plus the addition of land use control specific to vapor intrusion. The existing system would continue to use the existing vapor extraction wells and the existing SVPMs. The existing vapor phase **GAC** would continue to be used to remove the VOCs prior to discharge in compliance with substantive state air discharge requirements. **LUCs** would be used to identify the need to control potential vapor intrusion exposure for any newly constructed structures on the site.

Alternative SV-3: Soil Vapor Monitoring, LUCs, Continued Operation of the SVE Containment System, and Enhanced Soil Vapor Extraction at Site 1

This alternative would include the continued operation of the **SVE** Containment System as described in Alternative SV-2, plus the installation of additional **SVE** wells at Site 1 to target soil vapor near the potential pockets of residual VOCs. Targeting the removal of VOCs near the source would decrease the time required for the system to operate. This alternative assumes that up to six additional SVE wells and passive air injection wells would be installed in the source area. As with Alternative SV-2, **LUCs** would be used to provide notice of residual VOC contamination and the need to take appropriate actions to control the potential for vapor intrusion and a monitoring program consisting of monitoring of **SVE** wells and SVPMs.

Groundwater Alternatives

Alternative G-2: Monitoring and LUCs

This alternative consists of monitoring and **LUCs** for groundwater **COCs** consisting of PCBs, arsenic, hexavalent chromium, and total chromium. These **LUCs** would be in addition to the current restrictions for VOCs in groundwater. Monitoring would be conducted to track the migration and attenuation of the **COCs** over time. The **LUCs** would be used to control exposure to impacted groundwater.

Alternative G-3A and G-3B: Upgrade of the ONCT System with GAC Treatment (G-3A, PCBs) or Ion Exchange Treatment (G-3B, Hexavalent Chromium)

Alternatives G-3A and G-3B include the same monitoring and **LUCs** as Alternative G-2, but also include provisions for adding treatment for metals and PCBs to the existing ONCT System. Both alternatives are based on Northrop Grumman continuing to operate the ONCT for VOC treatment. Alternative G-3A assumes that PCBs would enter the ONCT System at concentrations that would require treatment. A liquid phase GAC would be used to treat PCB contamination. Alternative G-3B is similar to Alternative G-3A, except it assumes that arsenic, chromium, or hexavalent chromium enters the treatment system and that ion exchange would be used to treat for the metals. These alternatives were developed to ensure that the ONCT system can comply with discharge permits and continue operation if migration of PCBs or metals in groundwater occurs.

Table 6 - Ranking of Groundwater Alternatives

Criterion	Alternative G-2: Monitoring and LUCs	Alternative G-3A: Monitoring, LUCs, and Upgrade of the ONCT System with GAC Treatment	Alternative G-3B: Monitoring, LUCs, and Upgrade of the ONCT System with Ion Exchange Treatment
Overall Protection of Human Health and the Environment	●	◊	◊
Compliance with ARARs	●	●	●
Long-Term Effectiveness and Performance	●	◊	◊
Reduction of Toxicity, Mobility, or Volume through Treatment	NA	◊	◊
Short-term Effectiveness	●	●	●
Implementability	◊	◊	◊
Time to Reach RAO (years)	30 Years	30 Years	30 Years
Cost			
Capital	$230,000	$3,100,00	$2,200,000
O&M	$96,000 to $111,000 per year	$153,000 to $168,000 per year	$550,000 to $565,000 per year
Net Present Value	$2,600,000	$6,900,000	$15,800,000

NA = Not Achieved ○ = Low Ranking ● = Moderate Ranking ◊ = High Ranking

Evaluation of Alternatives

The remedial alternatives were analyzed in detail and compared to each other using seven of the nine criteria provided in the **NCP** (40 CFR 300.430 (e)(9)(iii). The remaining two criteria, State Acceptance and Community Acceptance, referred to as Modifying Criteria, are applied during consideration of public comments on the Proposed Plan, in preparation for selecting a remedy.

An evaluation of the site-wide alternatives is provided in Table 4 (soil), Table 5 (soil vapor) and Table 6 (groundwater), in accordance with the seven criteria listed as follows:

Threshold Criteria

- Overall Protection of Human Health and the Environment
- Compliance with **ARARs**

Primary Balancing Criteria

- Long-term Effectiveness and Performance
- Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment
- Short-term Effectiveness
- Implementability
- Cost

NYSDEC has been consulted in selecting the preferred alternatives but final State comments will not be submitted until after the community has had an opportunity to submit comments on this **Proposed Plan**. Community Acceptance is evaluated based on comments received during the comment period. Additional information on the evaluation criteria can be found on page 21 "How are Remedial Alternatives Evaluated".

Summary of Preferred Alternatives

The Navy's preferred alternatives for Site 1 are Alternatives S-6A, SV-3, and G-2. This combination of alternatives is expected to be protective of human health and the environment and comply with **ARARs**. It was

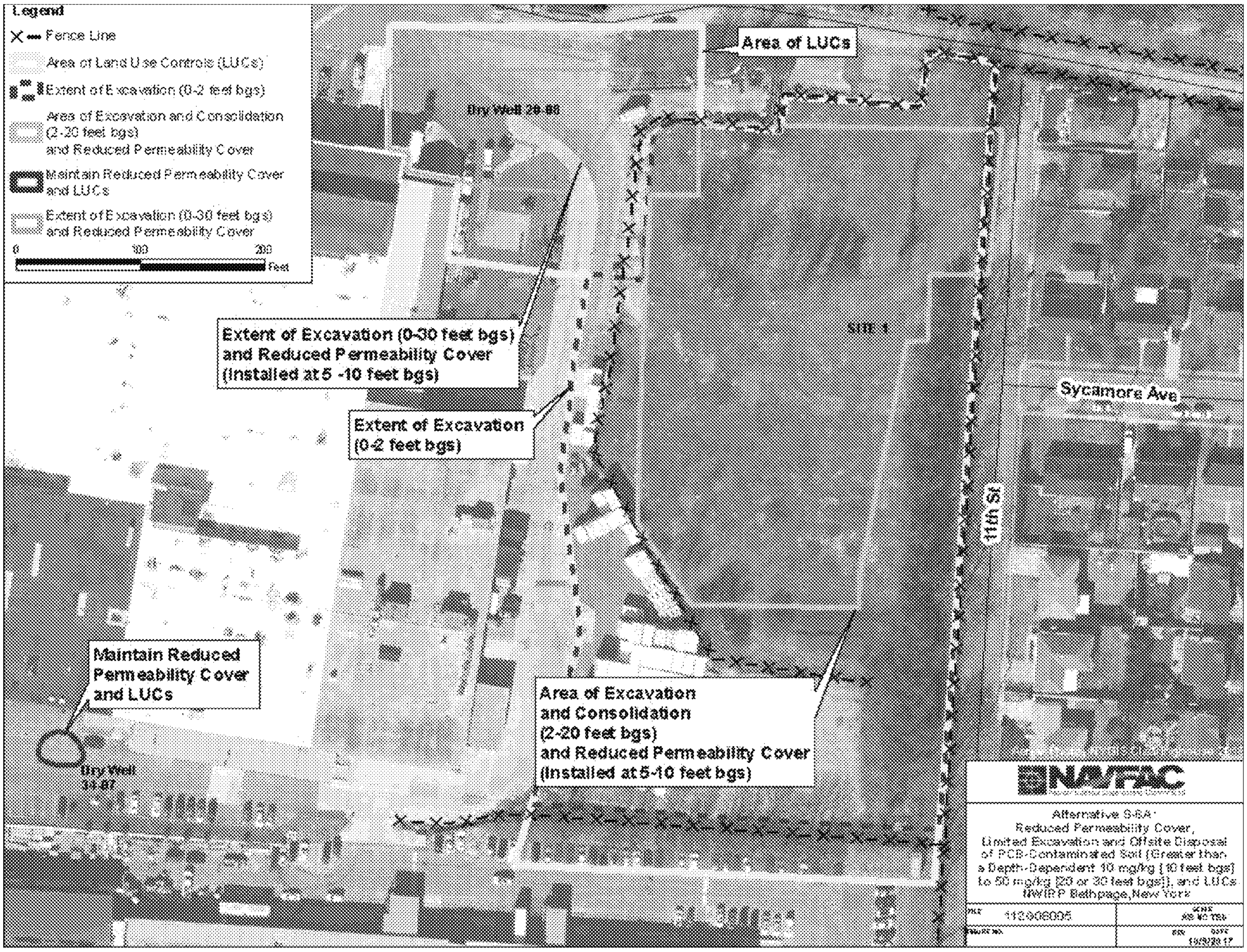


Figure 5 - Preferred Soil Alternative (S-6A)

selected based on careful consideration of effectiveness, implementability, and cost of each of the alternatives provided in Tables 4, 5, and 6. Alternative S-6A results in the removal and off site disposal of the majority of the PCBs at Site 1, covering to prevent human contact with contaminants, and the use of a reduced permeability cover to reduce continuing migration of PCBs to groundwater. Alternative SV-3 accelerates the removal of residual VOCs at Site 1 and will ultimately allow the SVE Containment System to be discontinued. The monitoring identified under Alternative G-2 is used to evaluate the effectiveness of Alternatives S-6A and SV-3, and to determine whether additional action would be required to address potential migration of PCB– and metal-impacted groundwater. The Navy's cleanup strategy for Site 1 is detailed below.

Soil Alternative

For Alternative S-6A, soil contamination would be addressed by excavation and onsite consolidation or offsite disposal of PCB-impacted soil with concentrations greater than 1 mg/kg to a depth of 2 feet bgs and 10 mg/kg to a depth of 10 feet bgs; and excavation and offsite disposal of PCB-impacted soil with concentrations greater than 50 mg/kg to a depth of 20 feet bgs at Site 1 and to a depth of 30 feet bgs at Dry Well 20-08 (Figure 5). Other soil with site-specific **COCs** greater than the **PRGs** would be handled with the PCBs. Approximately 4,100 pounds of PCBs in 30,000 cubic yards of impacted soil would be removed from the site and disposed of in an offsite landfill. This soil would be treated as required to comply with Land Disposal Restrictions.

At Site 1 and Dry Well 20-08, a one-foot thick reduced permeable cover would be constructed at approximately 5 to 10 feet bgs over the area with residual PCBs. The cover would consist of a clay or cement modified soil to achieve the reduced permeability cover. At Dry-Well 34-07, the existing reduced permeability cover would be maintained. The total volume of the cover materials is approximately 3,000 cubic yards. **LUCs** would be implemented at Site 1, Dry Well 20-08, and Dry Well 34-07 to prevent

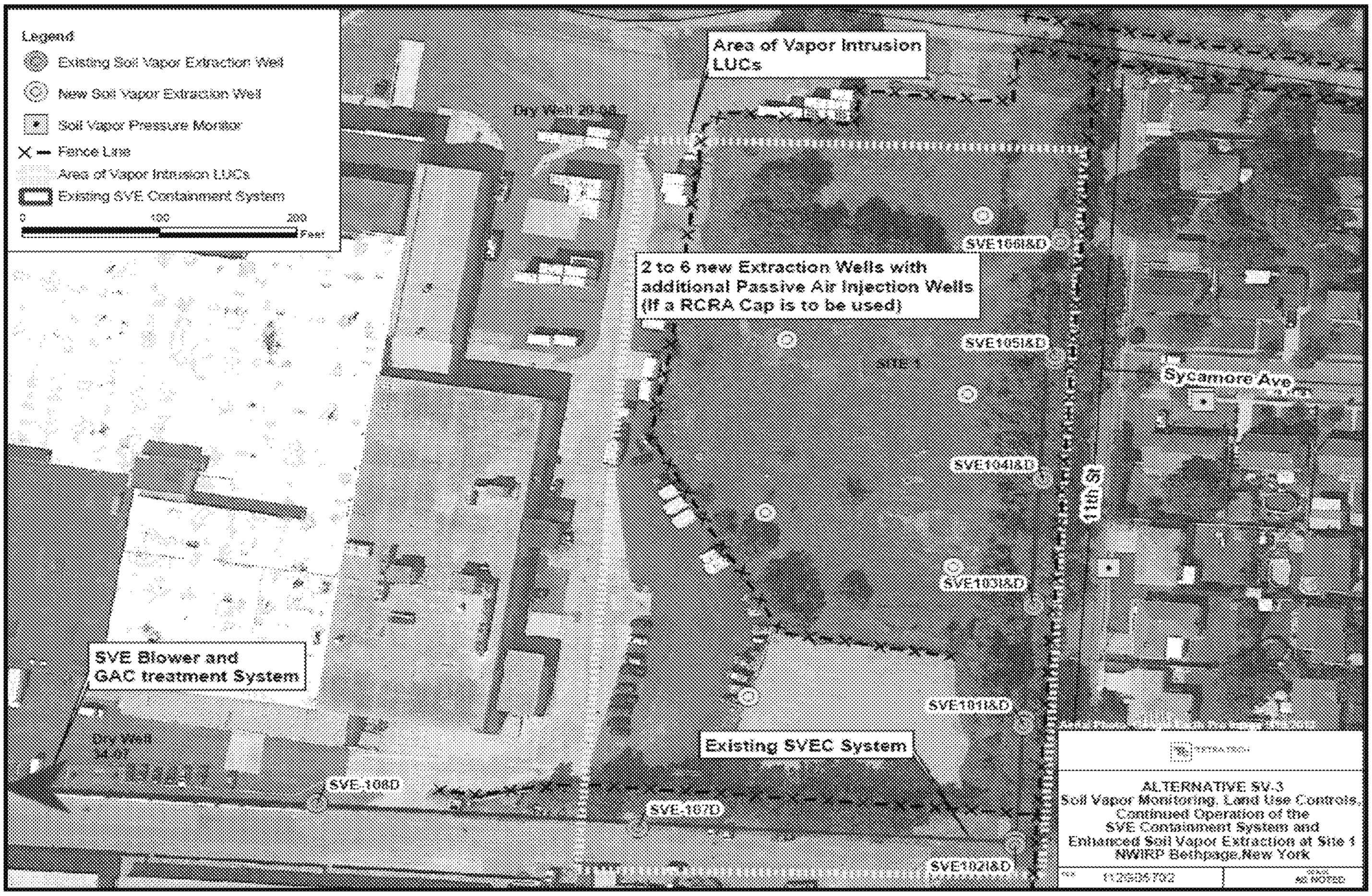


Figure 6 - Preferred Soil Vapor Alternative (SV-3)

future damage to the cover and/or use of remaining contaminated subsurface soil.

The estimated capital cost and present value cost of the Preferred Alternative for soil is $25,600,000 and $26,000,000, respectively. Annual costs vary, based on the activity being conducted in each year and range from cover maintenance costs of $12,800 per year to 5-year review and **LUCs** costs of approximately $30,000 per every 5 years (30 years).

Soil Vapor Alternative

For Alternative SV-3, potential vapor intrusion would be addressed by supplementing the existing **SVE** Containment System, monitoring, and **LUCs** (Figure 6). The operation of the **SVE** Containment System would continue and additional **SVE** wells would be installed to target soil vapor near the potential pockets of residual VOCs. Soil vapor extraction would remove COCs adsorbed to soils in the unsaturated (vadose) zone. Vapors extracted from the subsurface would be treated by **GAC** as needed to comply with state air discharge standards. Monitoring would include sampling of already present off-property SVPMs, sampling of **SVE** wells, air sampling for regulatory compliance, and maintenance and O&M of the existing **SVE** Containment System. O&M activities include system maintenance and potential replacement of **GAC** treatment. **LUCs** would be used to provide notice of residual **VOC** contamination and the need to take appropriate actions to control the potential for vapor intrusion.

The estimated capital cost and present value cost of the Preferred Alternative for soil vapor is $220,000 and $1,700,000, respectively. Annual costs vary based on the activity being conducted in each year and range from costs of $110,000 to $125,000 per year (30 years) for reporting, electricity, telemetry, 5-year review, and **LUCs.**

Groundwater Alternative

For Alternative G-2, groundwater would be addressed by monitoring and **LUCs**. Monitoring would be conducted to track the migration and attenuation of the **COCs** over time. Monitoring for Alternative G-2 would consist of the use of existing and new wells. The existing monitoring wells are presented on Figure 7. Groundwater samples would be collected until cleanup levels are achieved. This data will also be used to evaluate whether additional actions are required at the ONCT System. The samples would be analyzed for metals and PCBs. During the monitoring program, optimization activities to modify the number of wells, sampling frequency, and analytes would be conducted.

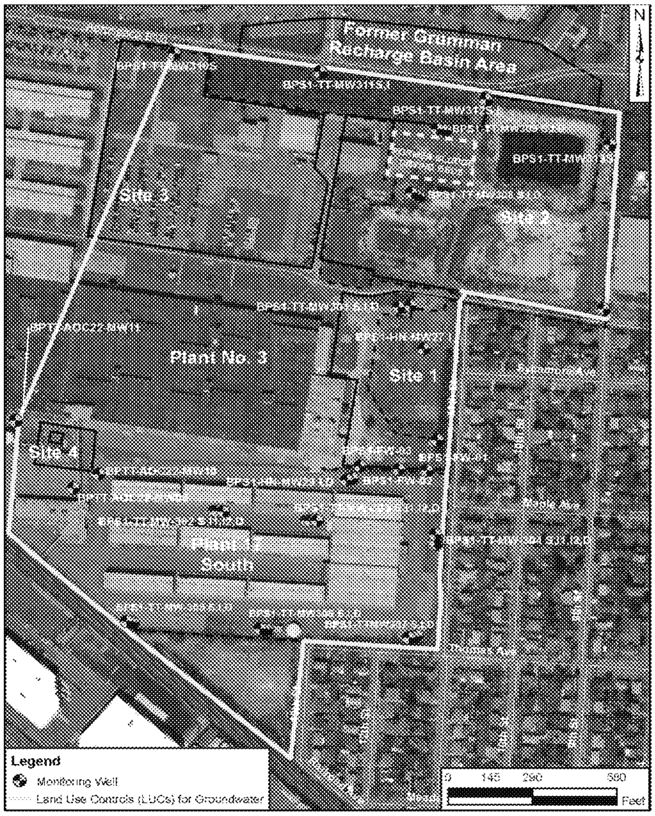


Figure 7 - Alternative for Groundwater (G-2)

The **LUCs** would be used to control exposure to impacted groundwater. The **LUCs** would consist of limiting the installation of groundwater extraction wells and/or the use of contaminated groundwater. Groundwater monitoring would be conducted to evaluate groundwater migration and the potential effects of soil remediation on groundwater, and the potential need to take additional actions.

The estimated capital cost and present value cost of the Preferred Alternative for groundwater is $230,000 and $2,600,000, respectively. Annual costs vary, based on the activity being conducted in each year and range from groundwater sampling, O&M management, reporting, 5-year review, and **LUCs** costs of $110,000 to $125,000 per year (30 years).

Conclusion

Based on the information currently available, the Navy believes the Preferred Alternatives meet the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the seven criteria. The Navy expects the Preferred Alternatives to satisfy the following statutory requirements of **CERCLA** §121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; 5) satisfy the preference of treatment as a principal element. The preferred Alternatives can change in response to state and public comments or new information.

Community Participation

The Navy seeks input from the community on the **Proposed Plan**. A public comment period has been set for November 22, 2017 through January 22, 2018 to provide an opportunity for public participation in the remedy selection process for the Site. A public meeting is scheduled for December 12, 2017 from 3:30 PM to 7:00 PM at the Bethpage Community Center, 103 Grumman Road West, Bethpage NY 11714.

The Navy, in consultation with **NYSDEC**, may modify the preferred alternatives or select another alternative presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here. Comments will be summarized and responses provided in the Responsiveness Summary section of the **ROD**. The **ROD** is the Navy's final selection of the remedy for this site. Written comments may be sent to the Public Affairs Officer at the address below.

During the comment period, interested parties may submit written comments to the following address:

Public Affairs Officer
Code 09PA
Naval Facilities Engineering Command, Mid-Atlantic
9324 Virginia Ave. Rm. 302
Norfolk, VA 23511-30

For More Information

This **Proposed Plan** summarizes information that can be found in greater detail in the August 2016 **FS** Addendum and the May 2017 Supplement to the 2016 **FS** Addendum for this site. This and other site documents, which form the Administrative Record for this **Proposed Plan**, are available online at:

http://go.usa.gov/DyXF

A copy of the **ROD**, which selects the final remedy and includes the Responsiveness Summary, will also be made available on the website.

How are Remedial Alternatives Evaluated?

The remedial alternatives were analyzed in detail and compared to each other using seven of the nine criteria provided in the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) (40 CFR 300.430 (e)(9)(iii). These nine criteria are as follows:

Threshold Criteria

- Overall Protection of Human Health and the Environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Primary Balancing Criteria

- Long-term Effectiveness and Permanence
- Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment
- Short-term Effectiveness
- Implementability
- Cost

The remaining two criteria, State Acceptance and Community Acceptance, referred to as Modifying Criteria, are also considered in selecting a remedy. NYSDEC has been consulted in selecting the preferred alternative but final State comments will not be submitted until after the community has had an opportunity to participate in the selection process. Community Acceptance is evaluated based on comments received during the public comment period. (*See text box, Mark Your Calendar for the Public Comment Period and Meeting, on page 1.*)

Overall Protection of Human Health and the Environment

Alternatives must be assessed for adequate protection of human health and environment, in both the short and long terms, from unacceptable risks posed by hazardous substances or contaminants present at the site by eliminating, reducing, or controlling exposure to concentrations exceeding remediation goals. Overall protection draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

Compliance with ARARs

Alternatives must be assessed to determine whether they attain ARARs under federal environmental laws and state environmental or facility siting laws. If one or more regulations that are applicable cannot be complied with, a waiver must be invoked in accordance with CERCLA. Grounds for invoking a waiver are listed in CERCLA §121 would depend on site circumstances and alternative remedial approaches.

Long-Term Effectiveness and Permanence

Alternatives must be assessed for the long-term effectiveness and permanence they offer, along with the degree of certainty that the alternative will prove successful. Factors to be considered, as appropriate, include the following:

<u>Magnitude of Residual Risk</u> - Risk posed by untreated waste or treatment residuals at the conclusion of remedial activities. The characteristics of residuals should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.

<u>Adequacy and Reliability of Controls</u> - Controls such as containment systems and institutional controls that are necessary to manage treatment residuals and untreated waste must be shown to be reliable. In particular, the uncertainties associated with land disposal for providing long-term protection from residuals, assessment of the potential need to replace technical components of the alternative (such as a cap, a slurry wall, or a treatment system), and potential exposure pathways and risks posed if the remedial action would need replacement must be considered.

Reduction of Toxicity, Mobility, or Volume through Treatment

The degree to which the alternative employs recycling or treatment that reduces the toxicity, mobility, or volume will be assessed, including how treatment is used to address the principal threats posed by the site. Factors to be considered, as appropriate, include the following:

- The treatment or recycling processes the alternative employs and the materials that they will treat.
- The amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled.
- The degree of expected reduction in toxicity, mobility, or volume of hazardous substances due to treatment or recycling and the specification of which reduction(s) is occurring.
- The degree to which the treatment is irreversible.
- The type and quantity of residuals that will remain following treatment considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents.
- The degree to which treatment reduces the inherent hazards posed by principal threats at the site.

Short-Term Effectiveness

The short-term impacts of the alternative are assessed considering the following:

- Short-term risks that might be posed to the community during implementation.
- Potential impacts on workers during remedial action, and the effectiveness and reliability of protective measures.
- Potential environmental impacts of the remedial action, and the effectiveness and reliability of mitigative measures during implementation.
- Time until protection is achieved.

Implementability

The ease or difficulty of implementing the alternatives is assessed by considering the following types of factors, as appropriate:

- Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and ability to monitor the effectiveness of the remedy.
- Administrative feasibility, including activities needed to coordinate with other offices and agencies, and the ability and time required to obtain necessary approvals and permits from other agencies (for off-site actions).
- Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services, availability of necessary equipment and specialists and necessary additional resources, availability of services and materials, and availability of prospective technologies.

Cost

Capital costs to be considered include direct and indirect costs, annual O&M costs, and net present worth (NPW) of the capital and O&M costs. The NPW for the alternatives is calculated using a discount rate of 1.4 percent based on the Office of Management and Budget Circular A-94 updated in December 2015. The cost estimate accuracy range is expected to be plus 50 percent to minus 30 percent of the actual cost.

State Acceptance

The state's concerns that must be assessed include the following:

- The state's position and key concerns related to the preferred alternative and other alternatives
- State comments on ARARs or the proposed use of waivers

These concerns cannot be evaluated until the NYSDEC has reviewed and commented on the FS. These concerns will be discussed, to the extent possible, in the Proposed Plan to be issued for public comments.

Community Acceptance

This assessment consists of responses of the community to the Proposed Plan and includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This assessment can be completed after comments on the Proposed Plan are received from the public.

GLOSSARY

Administrative Record: An official compilation of site-related documents, data, reports, and other information that are considered important to the status of and decisions made relative to a Superfund site. The public has access to this material.

Applicable or Relevant and Appropriate Requirements (ARARs): Cleanup standards promulgated under federal environmental or state environmental and facility siting laws.

Biosparging: Air is injected into the subsurface to provide additional oxygen to promote/increase biological degradation.

Cap: Capping involves the installation of impermeable barriers over contaminated soils to restrict access and reduce infiltration of precipitation to prevent the vertical migration of soil contamination to groundwater. A cap would also restrict the mobility of surface soils, so off-property migration of surface soils would be prevented.

Chemical of Concern (COC): A contaminant found in site-specific media, deemed by the human health assessment estimation calculation rules to be a compound potentially contributing to human health risk. Chemicals are selected to represent site contamination.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601 to 9675: Commonly referred to as Superfund Law., CERCLA is a federal law which was passed in 1980 and amended in 1986 and again in 2002. CERCLA created a special tax that was placed in a trust fund to investigate and cleanup abandoned or uncontrolled hazardous waste sites that endanger public health and safety or the environment.

Comment Period: A time for the public to review and comment on various documents and actions taken. A minimum of a 30-day comment period is held to allow community members to review the Administrative Record file and review and comment on the Proposed Plan.

Contaminant: Any physical, biological, chemical or radiological substance or matter that, at a high enough concentration, could be harmful to human health or to the environment.

Corrective Measures Study (CMS): A corrective measures study (CMS) involves the identification and evaluation of remedial alternatives (i.e. remedies) for performing corrective action at one or more solid waste management units at a Resource Conservation and Recovery Act (RCRA) facility. It is prepared by the facility owner/operator with guidance or oversight from EPA or an authorized State.

Conceptual Site Model (CSM): A CSM conveys what is known or suspected about contamination sources, release mechanisms, and the transport and fate of those contaminants. The CSM is derived from available data and accepted principals of contaminate fate and transport.

Feasibility Study (FS): Analysis of the practicability of a remedial proposal. The FS usually recommends the selection of a cost-effective alternative.

Granulated Activated Carbon (GAC): Groundwater or vapor is passed through granulated activated carbon (GAC) for treatment. GAC is used to remove contaminants by adsorption.

Groundwater: Water beneath the ground surface that fills spaces between materials such as sand, soil or gravel to the point of saturation. In aquifers, groundwater occurs in quantities sufficient enough for drinking water, irrigation and other uses. As groundwater flows towards its point of discharge, it may transport substances that have percolated downward from the ground surface as it flows towards its point of discharge.

Hazard Index (HI): The sum of chemical-specific Hazard Quotients. A Hazard Index of greater than 1 is associated with an increased level of concern about adverse non-cancerous health effects.

Hazard Quotient: Exposure to a particular non-carcinogenic chemical may present a risk.

Human Health Risk Assessment: An evaluation of the risk posed to human health should remedial activities not be implemented.

Incremental Lifetime Cancer Risk (ILCR): Exposure to a particular carcinogenic chemical may present an increased risk of developing 1 additional case of cancer in 10,000. The EPA acceptable range is 1X10-6 to 1X10-4.

Information Repository: A file containing information, technical reports and reference documents developed for a site undergoing cleanup. This file is usually maintained in a place with convenient public access, such as a public library.

Land Use Controls (LUCs): Non-engineered instruments such as administrative and/or legal controls that minimize potential for human exposure to contamination and protect the integrity of the remedy.

Maximum Contaminant Level (MCL): U.S. EPA-published (promulgated as law) maximum concentration level for contaminants found in water in a public water supply system.

Monitoring: Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action. This includes the collection of samples with laboratory analysis for the contaminants of interest.

National Contingency Plan; National Oil and Hazardous Substance Pollution Contingency Plan (NCP): The NCP is codified in 40 C.F.R. Part 300. The purpose of the NCP is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants or contaminants.

New York State Department of Environmental Conservation (NYSDEC): The state agency responsible for administration and enforcement of environmental regulations.

New York Department of Health (NYSDOH): The state agency that promote health and protect the public from health problems.

Preliminary Remediation Goals (PRGs): Preliminary Remediation Goals are generally selected from the most stringent State and Federal criteria.

Proposed Plan: A plan which summarizes the preferred cleanup strategy and rationale. It also reviews the alternative(s) presented in detail in the FS. The Proposed Plan may be prepared either as a fact sheet or a separate document. The preparation of a Proposed Plan is a public participation requirement of CERCLA and the National Contingency Plan.

Record of Decision (ROD): An official public document that explains which cleanup alternatives was selected. The ROD is based on information and technical analysis generated during the RI/FS process and considers public comments and community concerns raised upon the issuance of the Proposed Plan. The ROD explains the remedy selection process and is issued following the conclusion of the public comment period.

Remedial Action: The actual construction or implementation phase that follows the remedial design for the selected cleanup alternative at a site.

Remedial Action Objective (RAO): An objective selected in the FS, against which all potential remedial actions are judged.

Resource Conservation and Recovery Act, as amended, (RCRA), 42 U.S.C. §§ 6901-6939(e): A federal law which ensures 1) the proper management of hazardous waste from the point of generation until final disposal and 2) that an owner and operator of a hazardous waste treatment, storage and disposal facility investigates and cleans up and releases necessary to protect human health and the environment.

Responsiveness Summary: A summary of oral and written public comments received during a comment period following issuance of the Proposed Plan and the responses to these. The responsiveness summary is an important part of the ROD, highlighting community concerns for decision makers.

Risk Assessment: This process evaluates and estimates the current and future potential for adverse human health or environmental effects resulting from exposure to contaminants.

Regional Screening Levels (RSL): U.S. EPA-published (promulgated as law) regional screening levels for contaminants found in soil.

Soil Cleanup Objectives (SCO): NYSDEC-published cleanup levels for contaminants found in soil.

Source Area: The zone of highest soil or groundwater concentrations, or both, of the chemicals of concern. The area considered to be the point of release.

Soil Screening Level (SSL): U.S. EPA risk-based soil screening levels (SSLs) that were designed to be protective of groundwater at most sites.

Superfund: Another term used to refer to CERCLA.

Soil Vapor Extraction (SVE): The soil Vapor Extraction containment system, operating as an interim measure, is used to control VOC migration into residential homes.

United States Environmental Protection Agency (U.S. EPA): The federal agency responsible for administration and enforcement of environmental regulations.

Vertical Barrier: Vertical barriers would be used to control soil vapor and groundwater migration. Vertical barriers are made of impermeable or semi-permeable materials to prevent or minimize passage of fluids through barrier walls.

Please print or type your comments for the Proposed Plan for Site 1 below.

Mark Your Calendar for the Public Comment Period

Public Comment Period

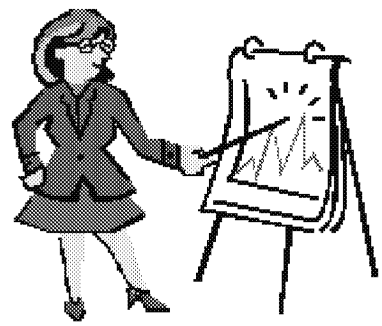
November 22, 2017 through January 22, 2018

Submit Written Comments

The Navy will accept written comments to the Proposed Plan during the Public Comment period.

The Navy will hold a public meeting on December 12, 2017 from 3:30 PM to 7:00 PM to discuss this Proposed Plan. The meeting will be held at:

Bethpage Senior Community Center
103 Grumman Road West
Bethpage, NY 11714



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